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ABSTRACT

This study examined whether the level of academic achievement changed when deaf pupils in Sweden were introduced to sign communication at the preschool or kindergarten level. The study compared performance of 40 deaf students, attending a school for the deaf, on a comprehensive testing program (covering Swedish language and mathematical and numerical ability) in grade 8 with performance of deaf students on the same tests in the 1960s before early sign language was commonly encouraged. The study found significant differences in performance between the current students and their orally trained age-mates. The level of academic achievement had risen, although results from tests of general intellectual ability and spatial/perceptual ability remained the same. Current students were particularly superior in the understanding and use of written Swedish, but the difference was also evident in numerical and mathematical tests. (Author/DB)

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ED 392 189

Bilingual vs Oral Education

A Comparison of Academic Achievement Levels in Deaf Eighth-graders from two Decades

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Abstract

Within the framework of a longitudinal project all pupils in grade eight at the School for the Deaf in Lund, Sweden, were assessed by means of a comprehensive testing program in 1985-89. The program had previously been used in a nationwide study of orally trained deaf pupils in 1965-69.

When results from the two decades were compared significant differences were found with regard to several tests. The level of academic achievement had risen, results from tests of general intellectual ability, spatial and perceptual ability remaining the same. Thus it could be stated that the students in the eighties, who had been exposed to sign communication since pre-shool age, were much better off than their orally trained age-mates in the sixties. They were particularly superior in the understanding and use of written Swedish, but the difference was also evident in numerical and mathematical tests.

During the first two thirds of this century oral methods prevailed in the education and upbringing of deaf children in Sweden. The children were expected to rely on lip-reading, use of residual hearing and speech for communication. In the oral period most deaf children had virtually no functional language, spoken or signed, when they started school.

In the late sixties, however, attitudes towards Sign language began to change, and in 1973 a systematic use of signs was introduced in special pre-schools for deaf children in the southernmost county of Sweden. In 1980 it was stated, in a supplement to the Curriculum for Compulsory Education, that education in schools for the deaf should be bilingual, in Sign language and Swedish.

Then, for the first time, there was an opportunity to study the development of a fairly large group of deaf children who had had access to sign communication as early as the pre-school period, or even before. Deaf children of deaf parents, who had been studied before, cannot be held to be representative of deaf children in general.

The study was carried out within the framework of a longitudinal investigation - "Learning Processes and Personality Development in Deaf Children" from 1977 to 1991 (Nordén e. al. 1979). The aim of the project was to document the development of prelingually deaf children exposed to sign communication in pre-school age, and to try to explore factors influencing their development.

Method and main problems

Data were collected by way of video recordings in combination with direct observations, 4 to 10 times a year. The children were studied in natural situations in pre-school and school. The first part of my doctoral thesis is a qualitative study of social competence in four children founded on these video recordings

In addition to the video recordings, the children were assessed by means of a series of more formal observations and tests, ending with a comprehensive testing program in grade 8 at the age of 15. The program, mainly comprising tests of the Swedish language and tests of mathematical and numerical ability, had been used in a nationwide study of deaf pupils in the sixties (Nordén, 1975). In 1985-1989 all pupils in the eighth grade at the School for the Deaf in Lund were tested. The study presented in this paper is a comparison of these test results with results from the same tests when performed on deaf eighth-graders in the sixties, when the instruction was mainly oral. The most essential question behind the study is: Did the level of academic achievement in deaf pupils change when sign communication was introduced in school and pre-school education?

Subjects

Hearing loss - degree and cause

There were 40 subjects, 21 boys and 19 girls, born 1970-74. The majority of the children had average hearing-losses greater than 93 dB HL. Two pupils with moderate hearing losses had specific language disorders as well and had attended the School for the Deaf since starting school.

Table 1

The cause of the hearing loss was hereditary in four subjects; eight were deaf due to maternal rubella; three were deaf due to CMV infection and six as a result of prematurity, often in combination with asphyxia at birth; one child was born with hydrocephalus; and three

had suffered from meningitis in their early years. In 15 subjects the cause was unknown or uncertain.

A total of 11 pupils (25%) had additional physical problems eg. motor disturbances, visual problems or specific language disorders, which influenced their learning ability and behavior to a greater or lesser degree. Psycho-social problems did exist, but are not reported in this study.

Sign language

When the systematic use of sign communication was introduced in the special kindergarten groups for hearing-impaired children, pre-school staff as well as hearing parents used so-called simultaneous communication, i.e. signs and speech at the same time. The children -- with a few exceptions -- had had no access to sign communication before joining a special pre-school group, or even until they began at the School for the Deaf. In other words, the children had access to signs at rather varying ages. Some started pre-school relatively late, some of them moved in from areas where Sign language was not equally accepted. A few had residual hearing which at that time was considered to motivate the exclusive use of speech, as it was thought that signing would interfere with the development of speech.

Table 2

As is shown in this table 50% of the children did not meet signs until their fifth year, which today is considered very late in Sweden. When they left compulsory school, all subjects were fluent in Sign language. Some of them had been able to develop a relatively good oral language as well, but their interpersonal mode of communication was Sign language.

Reading instruction and communication at the School for the Deaf

Throughout the primary and intermediate levels, the teachers (all hearing) used various combinations of signs and speech, ranging from a fluent simultaneous communication to mainly oral instruction supported by finger-spelling and single signs. At the secondary level (in grades 8 - 10) some teachers used Sign language exclusively. Reading and writing was mainly taught in a holistic, functional way in school. During a period in the late seventies, reading and writing had also been introduced in play activities in some of the pre-school groups.

Study of the achievement level in grade 8

In the course of five years all pupils in grade 8 at the School for the Deaf in Lund were assessed by means of a testing program comprising aptitude, achievement and problem-solving tests. When the program was developed by Nordén (1975) in the sixties, it also included practical tests and was designed to be used for educational and vocational guidance. Since the aim of my study was to compare the comprehension and use of the Swedish language and mathematical/numerical ability in deaf eighth-graders from the two different decades, I focused on tests of theoretical knowledge.

As at least some of the language tests from the original program could be expected to be too easy, the assessment was extended by two language tests not previously used with deaf subjects. A number of problem-solving tests and tests of spatial and perceptual ability were chosen as well to complement and give a background to the results of the tests of theoretical knowledge.

Instructions were imparted by signs, demonstrations and -- in the case of language tests -- in writing. With some of the tests, the deaf groups were allowed additional time

compared to the norms for hearing subjects. Factor analyses of preliminary results in the sixties had revealed that when time was short, real differences in achievement were concealed by a common time factor. A change of pens (from pencil to red pencil) was made at the end of the original time limit. This also allowed for a comparison with hearing subjects, as it was possible to count the items solved with the different pens.

Test results

The norms calculated in the sixties, expressed in a Stanine scale, were used in this study as well. Data were mainly analyzed by Analysis of Variance (ANOVA) and Multiple Classification Analysis (MCA).

Table 3

Initially, it can be concluded that results on Raven's Progressive Matrices do not indicate any difference in general intellectual ability between the groups from the two decades. Differences in results from other tests thus have to be explained by other factors than a dissimilar average level of intelligence.

Significant differences can be found with regard to several tests. The difference is great in tests of word knowledge and reading comprehension (Opposites, DLS 4-6), and it is also evident in numerical tests (Multiplication, Arithmetic) and mathematical tests (Combination of numbers, R16C). Although the difference in Written Composition is barely significant, the η^2 value tells us that it should not pass unnoticed.

With one exception, then, all tests of theoretical knowledge showed that the achievement level has risen, results from tests of spatial and perceptual ability remaining the same.

The single test in respect of which the achievement level was unchanged, Addition, probably represents a skill mastered by most eighth-graders in the sixties, whereas other rules of arithmetic were less well known to them.

From earlier studies (e.g. Nordén, 1975; Conrad, 1977; Allen, 1986), we know that deaf subjects generally score lower than hearing age-mates in tests of academic achievement. Research has also consistently demonstrated that deaf subjects rarely reach or exceed a reading proficiency comparable to that of a hearing child in the fourth grade.

To investigate whether this was still the case, the results of the subjects in my study were also compared to norms for hearing children I also observed if the added time had had any effect upon the achievement level. It turned out that the extended time was mainly important in tests of verbal ability. When subjects were allowed to work for a few minutes longer, their average results in reading-comprehension tests (DLS 4-6, DLS 7-9), and in a test of word knowledge (Opposites), exceeded the fourth grade level. Within the shorter time, 14 subjects (35%) achieved as well as, or better than, the average hearing fourth-grader. Five pupils had results comparable to, or better than, the average hearing eighth-grader. This means that most pupils had attained a functional reading level even if some were reading a bit slow.

In all verbal tests a group of poor performers could be identified, many of whom had additional physical handicaps or problems. For these pupils, the extended time did not result in much of a change.

There are some aspects of the differences in ability that are not sufficiently described by points and statistical analyses, however. Although deaf subjects in the eighties have made substantial gains in writing skills compared to their age-mates in the sixties, they are still far from the fluency and flexibility achieved by hearing subjects. Important qualitative differences can be noticed between subjects from the two decades, however. This can be

illustrated by two translated examples taken from the Composition test, one letter from each decade. Both texts include syntactical and grammatical errors not possible to translate.

"Hello Mother,
How are fine. I am you.
It is cold outside today.
We are going to speak well today."

Several letters from the 1960's are similar to this one, but this is an obvious example that the phrases had no real meaning to the writer. The pattern was probably set during writing lessons. Next is a letter written by a boy in the 1980's. The Dallas movie was running on TV by this time and this pupil wrote a letter to his best friend, who in turn wrote to his friend JR. The words in italics contains spelling errors or grammatical errors in Swedish. Parts of the letter have been left out to protect the identity of the writer.

"Hi there, Sr Ewing.
How are you? I am just fine. I am getting cramp on my right hand. You understand that, don't you. Perhaps in week 18 I and dad are going to London. That will be my fourth (the) time. Hopefully the weather will be splendid there.
This summer I and my family are perhaps going to Varberg to wind surf.
Are you going to Höllviksnäs, Sr Ewing. I am not, as I would rather go surfing with my board Tiga Fun Cup.
....
Next Sunday we are getting a puppy dog, it will be called No, sorry, I have forgotten what the dog is going to be called. You will learn later, but not now.
Maybe we can meet this summer, but I am not sure.
This evening I am going to play basket at Bollhuset 5.30 - 7.00 p.m. Tough but great fun
.....

See you, Bye-bye

In the sixties, stereotyped phrases virtually devoid of personal information were common - probably as an artifact of language training. Deaf pupils twenty years later never used standardized phrases. They tried to impart information, even if they were not always able to write with grammatical and syntactical correctness and they seemed to enjoy writing.

With regard to the tests of numerical and mathematical ability, none of which demanded reading proficiency, around 40 per cent of the deaf subjects in the eighties had results equal to, or better than, an average hearing eighth-grader. A group of very poor performers could be found in these tests as well. It is interesting to note, however, that on numerical mathematical tests pupils with additional disorders were generally neither at the very low extreme nor at a level comparable to that of hearing age-mates.

During the years of testing, it was obvious that different classes did not perform equally well. Even when differences in average level of intelligence, average degree of hearing loss, and parental socio-economic status were eliminated by statistical means, two groups (tested in 1985 and 1989) generally outperformed the others.

The video recordings and the qualitative study, which was also included in my thesis, focused on the social interaction of the children and not on teacher behavior. Though teacher influence can probably explain some of the differences between groups, there were other factors that turned out to be worth exploring. Being the school psychologist, I had access to information concerning the history of the children before they started school. Through personal visits and conference notes, I also had a chance to study group processes and changes in group structure. When this information was compiled with the video recordings, it added considerably to the explanation of the group differences. The interplay pattern developing

over a period of time in the different groups were more or less favourable and promoting. The combination of different pupil personalities and the group-dynamic development in the annual cohorts were evidently related to their level of achievement.

An important finding that was partly related to differences between cohorts in the eighties, is that results on tests of Swedish language were related to age when the child was exposed to Sign language. Pupils with early access to signs performed better on tests of Swedish.

The answer to the research question presented is then: Yes, there was a dramatic change in the level of academic achievement in deaf pupils when sign communication was introduced in school and pre-school education.

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Table 1

Average hearing losses (dB HL 250-4000Hz)

-60dB	-70dB	-80dB	-90dB	-100dB	-100dB	n
1	1	6	7	7	18	40

Table 2

Age when signs were made available to the child

0-2 yrs	2-3 yrs	3-4 yrs	4-5 yrs	5-6 yrs	6 yrs-	n
3	5	10	8	3	11	40

Table 3

Test results. Pupils in grade 8 at Schools for the Deaf

1967-69 (Nordén) and 1985-89 (Heiling)

	1967-69 (n=104)		1985-89 (n=40)				
Test	M	SD	M	SD	F	p	η^2
Language tests							
Opposites	11.4	3.67	15.8	3.25	42.7	***	0.23
DLS 4-6	15.3	6.01	19.0	6.09	10.9	***	0.07
DLS 7-9[1])			22.5	7.02			
Sentences[1])			5.9	3.98			
Written Composition	4.6	2.19	5.4	2.33	3.7	-	0.03
Numerical and Mathematical tests							
Addition	31.9	10.69	32.6	9.82	0.1	-	0.00
Multiplication	22.1	10.60	28.3	9.40	10.3	**	0.07
Arithmetic	18.7	7.62	22.8	8.31	7.7	**	0.05
R16C	9.2	4.69	11.7	5.42	7.4	**	0.05
Comb.of numbers	9.7	4.01	11.8	3.37	8.1	**	0.05
Problem-solving and spatial tests							
Raven's matrices	38.8	9.48	40.3	7.62	0.8	-	0.01
Puzzle	9.7	4.11	9.9	3.74	0.0	-	0.00
NIIP	3.6	1.76	3.1	1.71	2.2	-	0.02
F1	1.9	0.73	1.8	0.85	0.6	-	0.00
Perceptual routine exercises							
Substitutes	157.0	44.01	154.9	44.33	0.1	-	0.00
Identical figures	41.4	11.77	44.7	12.65	2.2	-	0.02

1) Only used in the 1985-89 study.